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able experiments, with those of Bütschli, Hardy and others, have shown how much caution is necessary in the interpretation of the coagulated material observed in sections; but they have produced in some minds a pessimism regarding the morphological investigation of the cell that is without justification. The cyclical changes observed in sections of fixed material are not a matter of chance, but form a highly significant connected series, and many of them have been fully confirmed by comparison with the living material. The experiments in question have provided us with a valuable critique of our methods, but have not destroyed their value. Even though we may not agree with all the conclusions set forth in the present paper, we must regard it as weighing heavily on the side of the view that the cell possesses a definite and complex morphological organization that passes through perfectly ordered cyclical changes, and of which our cytological methods give us not indeed a photographic image, but still a definite record.

EDMUND B. WILSON.

Elements of Mineralogy, Crystallography and Blowpipe Analysis. By ALFRED J. MOSES and CHARLES L. PARSONS. New York, D. Van Nostrand Co. 1900.

The edition of the book before us is in plan essentially like the former edition of 1895. Many parts have, however, been re-written and considerable additions are to be noticed in text and illustration.

The part devoted to crystallography has undergone complete revision, and in its treatment of the subject conforms to the prevailing classification. Over one hundred figures, for the most part excellent, have been added and we are pleased to note a new chapter treating entirely of twin crystals. The chapters on blowpipe analyses treat of the apparatus used in, and the operations of, blowpipe analyses. A summary of blowpipe tests is also given with a short scheme for qualitative blowpipe analysis.

The descriptive mineralogy opens with chapters treating of the various characters of minerals, that on optical characters being intended as introductory to a subsequent study of minerals in thin sections under the microscope. In the part describing the individual minerals we

find them grouped according to the economic classification, viz., iron minerals together, copper minerals together, etc. Before each group a brief discussion is made of the uses of the particular metal in hand, the minerals from which it is obtained and the metallurgical processes involved in its production. We think this an excellent feature of the book. The silicates do not yield to such a classification and are grouped according to the usual chemical classification. While the descriptive part as a whole and in many of its details seems to us excellent and worthy of commendation, we can not but express our regret that it should be marred by so many poor illustrations. The crystal drawings are excellent, but with few exceptions the other illustrations are not what they should be. It is doubtless difficult to represent the characteristic appearance of a mineral on paper and unless great pains is taken in this regard it were better for both books and mineralogy not to attempt such illustration.

In describing the crystallization of the minerals we notice that the real angle between the crystal faces are given instead of the supplementary angle as is customary. As the latter angles are the ones most convenient for use in calculation it would seem desirable to have had them given.

The book is concluded by a series of tables designed for the rapid determination of the common minerals.

C. H. W.

A Text-Book of Important Minerals and Rocks.

By S. E. TILLMAN. New York, John Wiley and Sons; London, Chapman & Hall. 1900.

Professor Tillman has prepared this book with the idea of furnishing the general student of mineralogy with a convenient and serviceable book, condensed in form, yet sufficiently complete in descriptive matter to equip the student with a good general knowledge of the subject.

The opening chapter consists of a very brief outline of the crystallographic character of minerals. The second treats of other physical characters and of the chemical properties of minerals. With the latter is included a brief description of blowpipe and chemical tests. That four pages should be deemed sufficient for

the treatment of a subject so very important is rather astonishing, and it is the deficiency in this regard that will we fear detract from the general usefulness of the work. The main part of the book contains the descriptions of the individual mineral species, of which some seventy-five are described, and their occurrence and uses commented on. A series of tables for the determination of the minerals, chiefly by means of their physical characters, are included in the descriptive part and is designed to supplement the latter. Part II. furnishes a brief description and classification of the more common rocks.

C. H. W.

Lehrbuch der anorganischen Chemie. Von PROFESSOR DR. H. ERDMANN, in Halle. Zweite Auflage, mit 287 Abbildungen, einer Rechen-tafel und sechs farbigen Tafeln. Braunschweig, Druck und Verlag von Friedrich Vieweg und Sohn. 1900.

To quote from the author's preface. "First of all a text-book of chemistry should give reliable data concerning the properties and reactions of substances; here were gaps to be filled, for our larger manuals generally take without criticism the frequently contradictory statements and figures of different authors. The most accurate data, however, remain lifeless matter for reader and student unless the book explains the occurrence of substances on a geological basis, gives due attention to their therapeutic and toxic properties, and due recognition of their importance for the common weal by a consideration of their varied application, and by statistics of production and price; nor should the historical aspect of the subject be neglected."

Through certain improvements in this edition "somewhat more space could be devoted to those theories which have sprung up on the boundary space between physics and chemistry. Yet their views should never occupy the main place in the presentation of chemistry. He who leads the student into our science by a by-path instead of stimulating him to *pure chemical thought*, does in verity make chemistry a 'science of inferior worth'" (Ostwald).

"As Clemens Winkler aptly says, 'physical chemistry in no sense covers the same field as

inorganic chemistry, for the latter, far from being a closed branch of science, offers countless problems which must be solved by quite other methods than those furnished by the theory of ions.'"

The quotations indicate the character of the book. It is a masterpiece of descriptive chemistry, a book written for riper German university students. If a translation is made it will doubtless be harmfully introduced into our colleges, possibly into high schools. As there is fortunately no translation as yet, the use of the book will be limited to teachers and older students reading German, and to them it will be a benefit and a pleasure.

As introduction, the author in seventy-five pages discusses weight and measure, heat, theories of gases, Avogadro's law, laws of chemical changes, etc. In short, he has brought together what is generally scattered throughout the book. If this were a book for beginners this method would be open to adverse criticism. For older students the reviewer believes it to be the better arrangement, especially when the treatment is as good as here. The author tacitly assumes that the reader is prepared by previous study to follow him without diffuse explanations.

The next division covers the non-metals in 400 pages, the last division the metals in 320 pages. Erdmann divides the non-metals as follows: *Chief gases*, oxygen, hydrogen, nitrogen. *Noble gases*, helium, neon, argon, krypton, xenon. *Air*. *Sulphur group*, sulphur, selenium. *Halogens*, fluorine, chlorine, bromine, iodine. *Phosphorous group*, phosphorous, arsenic, antimony. *Carbon group*, boron, carbon, silicon, germanium.

It is evident from this division that the author does not utilize the periodic system as a means of instruction; indeed he only devotes three pages at the close of the book to the system, his treatment coinciding with that of Ostwald's 'Grundlinien der anorganischen Chemie' in this respect, but in no other. This shelving of the periodic system is to be regretted; it does not accord with the influence which this system exerted and still exerts in the chemical thought and chemical work of the last thirty years and of the present.

At the close of each chapter is a beautifully